Spot Safety Project Evaluation

Project Log # 200412117
Spot Safety Project # 12-96-018

**Spot Safety Project Evaluation, of the Traffic Signal Installation,
At the Intersection of NC 18-Fallston Road and NC 180-North Post Road,
Near Shelby, Cleveland County**

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
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Principal Investigator

_____ ___8/26/05 _
Carrie L. Simpson Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 12-96-018 – The Intersection of NC 18-Fallston Road and NC 180-North Post Road, near Shelby, Cleveland County

Introduction

In an attempt to assess the safety of our roads, the Safety Evaluation Group of the Traffic Safety Systems Management Section has evaluated the above project. The methodologies used in this evaluation offer various philosophies and ideas, in an effort to provide objective countermeasure crash reduction results. A naive before and after analysis and an Odds Ratio comparison analysis has been completed to measure the effectiveness of the spot safety improvement. This information is provided to you so the benefit or lack of benefit for this type of project can be recognized and utilized for future projects.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of a three-phase actuated traffic signal. D. D. Galloway, Regional Traffic Engineer, originally requested the improvement. NC 18-Fallston Road is a four-lane facility (with a left turn lane on the southbound approach) and NC 180-North Post Road is a two-lane facility at the treatment intersection. Both NC 18-Fallston Road and NC 180-North Post Road have a speed limit of 55 mph within the vicinity of the intersection. Prior to the spot safety improvements, the subject location was controlled by stop signs on NC 180-North Post Road.

The initial crash analysis for this location was completed from May 1, 1993 through April 30, 1996 with a total of thirteen Angle Crashes. A fatal crash occurred on May 8, 1996. In addition, this location met Volume Warrants 1, 9, and 11. The final completion date for the improvement at the subject intersection was on February 23, 1998.

Comparison Analysis

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from January 1, 1998 through May 31, 1998. The before period consisted of reported crashes from January 1, 1992 through December 31, 1997 (6 Years) and the after period consisted of reported crashes from June 1, 1998 through May 31, 2004 (6 Years). The ending date for this analysis was determined by the available crash data at the time the crash analysis was completed.

The analysis also consisted of two different sets of data, the treatment and the comparison data. The treatment data consisted of all crashes within 150 feet of the subject intersection. The comparison data consisted of all crashes within 150 feet of the intersections of:

NC 18-Fallston Road at SR 1859-Belleview Road,
NC 18-Fallston Road at SR 1337-Zion Church Road,
NC 18-Fallston Road at SR 1869-Wright Road,
NC 18-Fallston Road at SR 1824-SR 1923-Sanders Road,
NC 18-Fallston Road at SR 1808-Double Shoals Road, and
NC 18-Fallston Road at SR 1906-Costner Road.

Please see attached *Location Map* for further detail. The following data table depicts the Naive Before and After Analysis for the treatment and comparison intersections. Please note that Frontal Impact Crashes were the target crashes for the applied countermeasure. The Frontal Impact Crash types considered are as follows: Left turn, same roadway; Left turn, different roadways; Right turn, same roadway; Right turn, different roadways; Head on; and Angle.

Treatment Information

	Before	**After**	**Percent Reduction (-)/ Percent Increase (+)**
Total Crashes	27	17	- 37.0
Total Severity Index	10.45	8.07	- 22.8
Frontal Impact Crashes	17	11	- 35.3
Frontal Severity Index	14.27	3.69	- 74.1
Volume	12,200	10,900	- 10.7

Comparison Information

	Before	**After**	**Percent Reduction (-)/ Percent Increase (+)**
Total Crashes	52	36	- 30.8
Total Severity Index	10.67	19.44	82.2
Frontal Impact Crashes	13	13	0.0
Frontal Severity Index	17.78	28.88	62.4
Volume	9200	9200	0.0

Odds Ratio: Treatment versus Comparison

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Treatment Total Crashes	27	17	---
Comparison Total Crashes	52	36	- 9.1 %

The naive before and after analysis at the treatment location resulted in a 37.0 percent decrease in Total Crashes, a 22.8 percent decrease in the Total Severity Index, and a 10.7 percent decrease in Average Daily Traffic (ADT). The comparison locations experienced a 30.8 percent decrease in Total Crashes, an 82.2 percent increase in the Total Severity Index, and no change in ADT. The before period ADT year was 1994 and the after period ADT year was 2001.

The Odds Ratio is used as another means of calculating the treatment effect. The number of crashes in the before and after period from the comparison locations are used to calculate the percent reduction in crashes for the Treatment Intersection. As shown in the previous table, using the Odds Ratio calculation, there is a 9.1 percent decrease in Total Treatment Intersection crashes.

The following Table consists of an Injury Summary for the treatment intersection. As shown below, the number of Total Injuries decreased by 64.5 percent. All injury types decreased from the before to the after period.

Injury Summary	Before Period	After Period	Percent Change
Fatal Injuries	1	0	- 100.0
Class A Injuries	3	1	- 66.7
Class B Injuries	13	1	- 92.3
Class C Injuries	14	9	- 35.7
Total Non-Fatal Injuries	30	11	- 63.3
Total Injuries	31	11	- 64.5

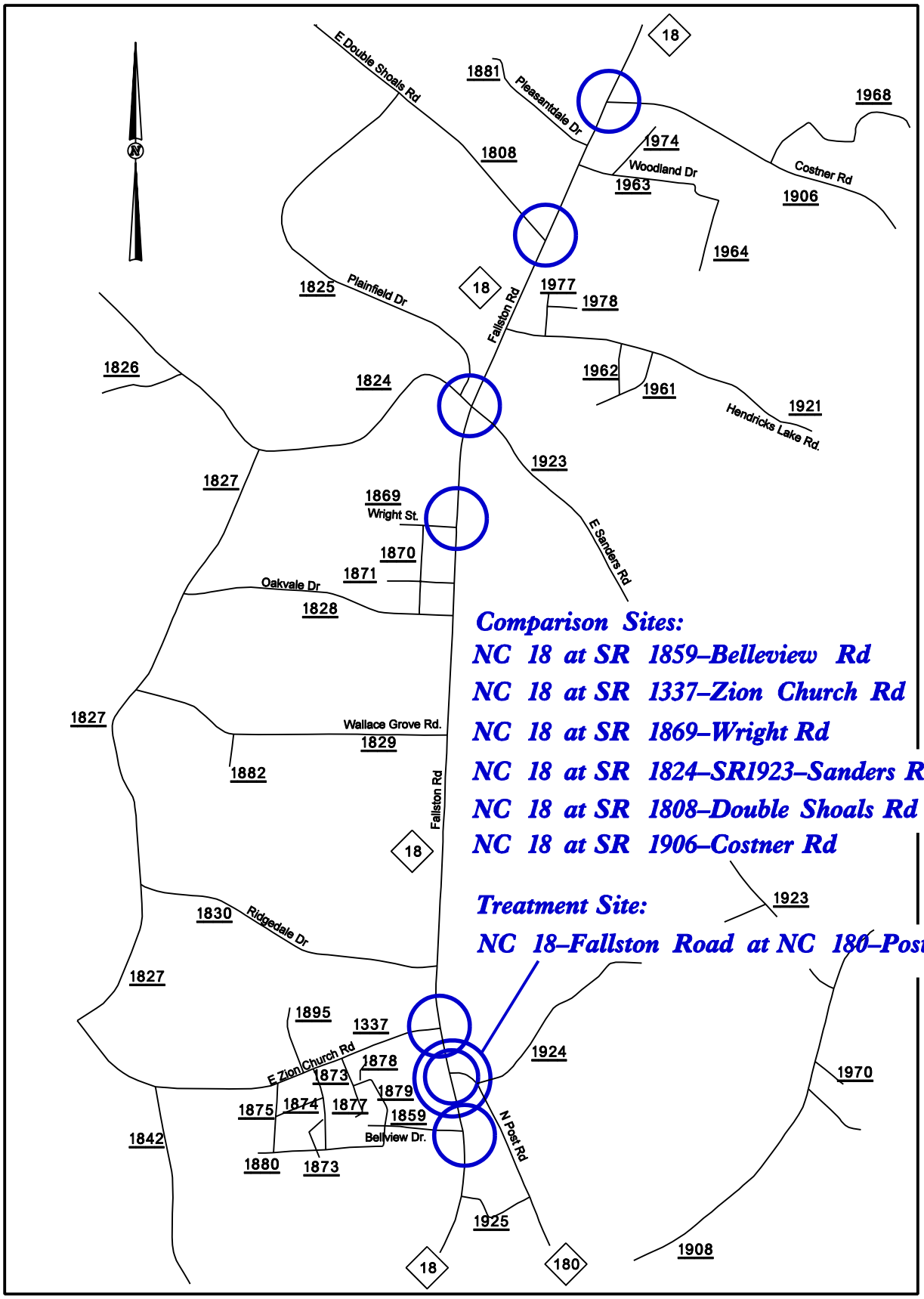
Results and Discussion

The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 37.0 percent decrease in Total Crashes and a 35.3 percent decrease in Frontal Impact Crashes. Using the Odds Ratio to calculate the treatment effect resulted in a 9.1 percent decrease in Total Crashes at the Treatment Intersection. The summary results above demonstrate that the treatment location appears to have had a decrease in the number of Total Crashes and Frontal Impact Crashes from the before to the after period using both analysis methods. Analysis of crash severity reveals that the Total Severity Index and Frontal Impact Severity Index decreased by 22.8 and 74.1 percent, respectively. The number of Total Non-Fatal Injuries decreased (by 63.3 percent) from 30 injuries in the before period to 11 injuries in the after period. The number of Fatal Injuries decreased from one in the before period to none in the after period.

The countermeasure crash reduction for Total Crashes at the subject intersection is in the range of a 9.1 percent decrease in crashes to a 37.0 percent decrease in crashes. The countermeasure crash reduction for Frontal Impact Crashes at the subject intersection is a 35.3 percent decrease in crashes. As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors.

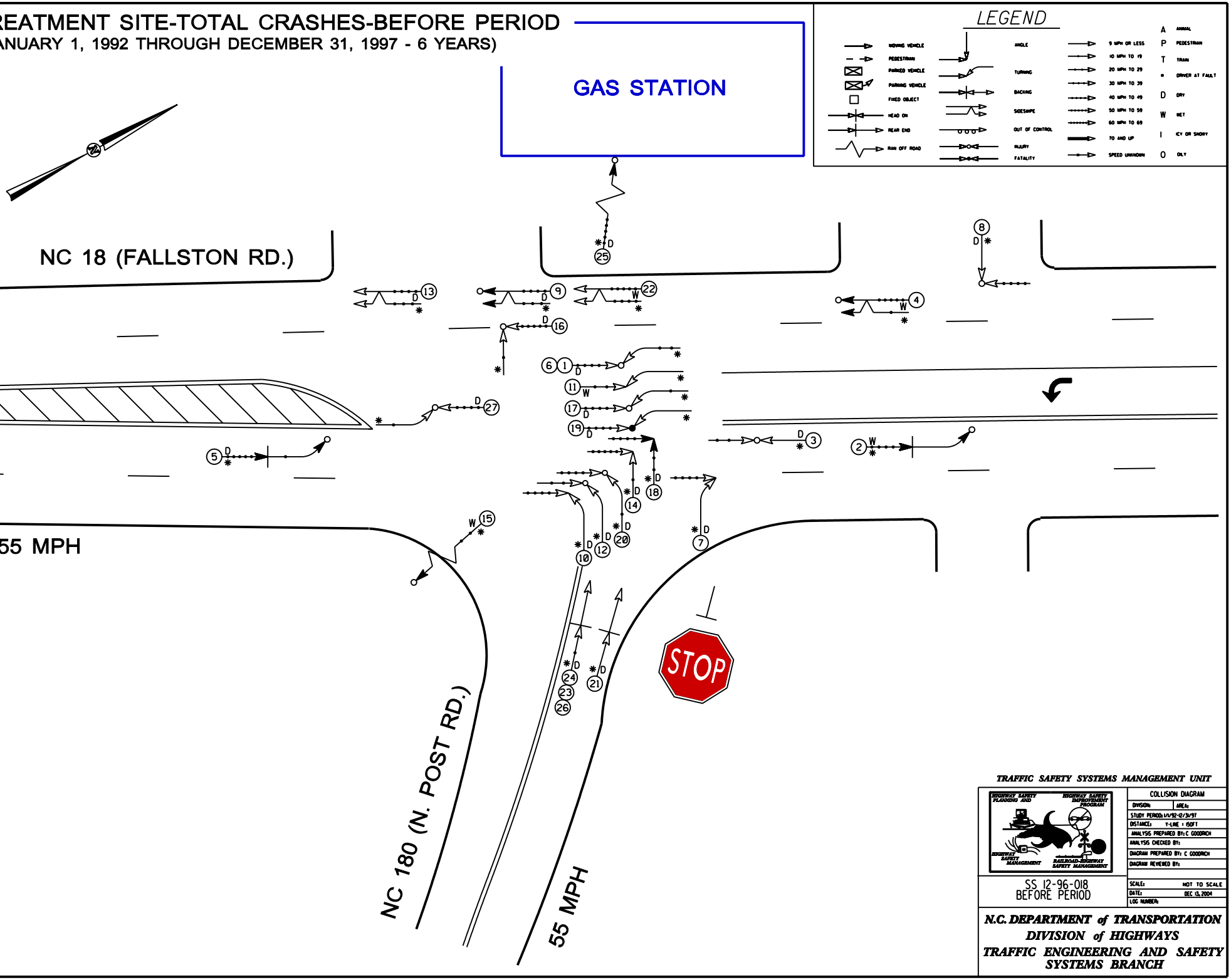
Location Map, Near Shelby, Cleveland County

Evaluation of Spot Safety Project Number 12–96–018



TREATMENT SITE-TOTAL CRASHES-BEFORE PERIOD

(JANUARY 1, 1992 THROUGH DECEMBER 31, 1997 - 6 YEARS)



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

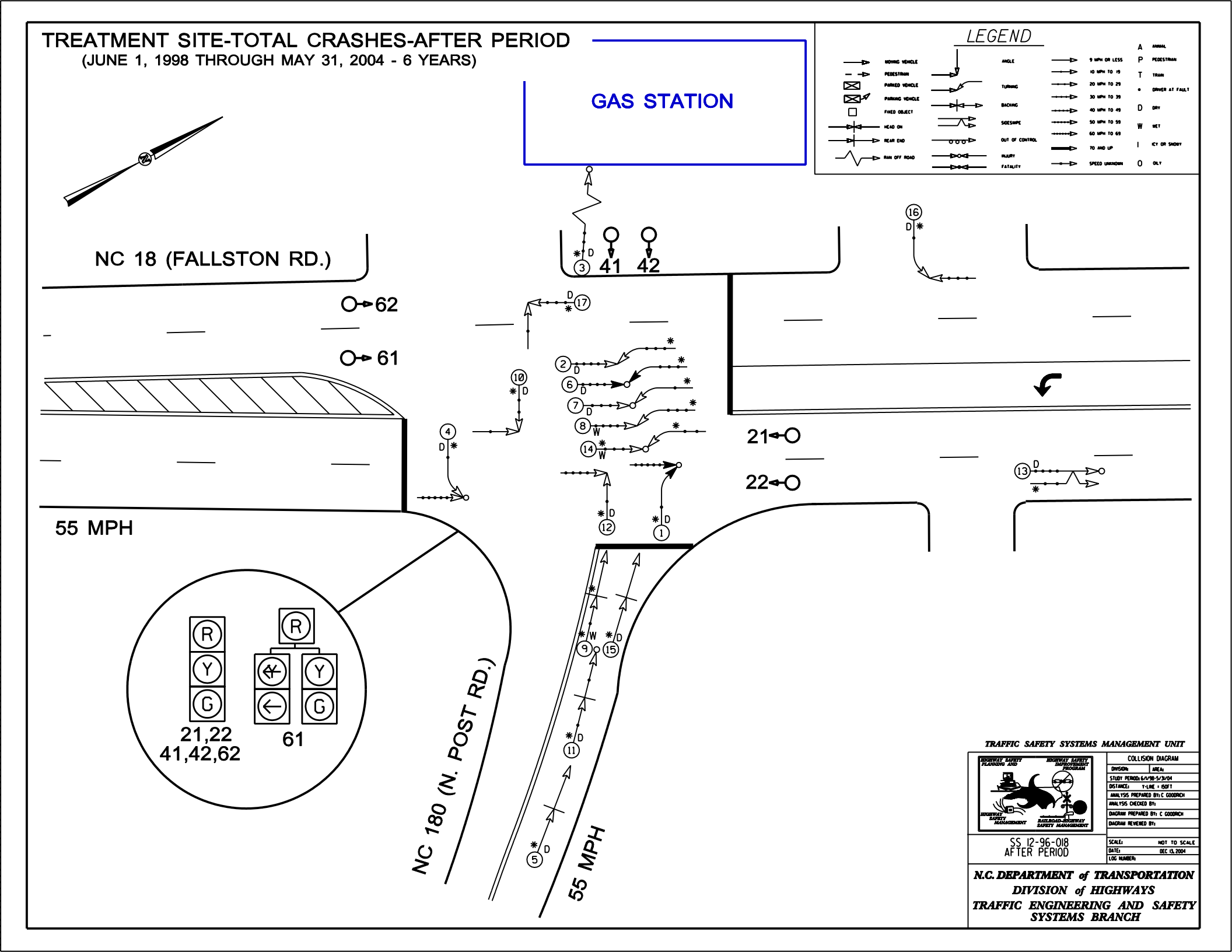
COLLISION DIAGRAM

SS 12-96-018
BEFORE PERIOD

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH

TREATMENT SITE-TOTAL CRASHES-AFTER PERIOD

(JUNE 1, 1998 THROUGH MAY 31, 2004 - 6 YEARS)



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

COLLISION DIAGRAM

DIVISION: AREA:

STUDY PERIOD: 6/1/98-5/31/04

DISTANCE: T-LINE + 150FT

ANALYSIS PREPARED BY: C GOODRICH

ANALYSIS CHECKED BY:

DIAGRAM PREPARED BY: C GOODRICH

DIAGRAM REVIEWED BY:

SCALE: NOT TO SCALE

DATE: DEC 13, 2004

LOG NUMBER:

SS 12-96-018
AFTER PERIOD

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH